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EXAMINER	
CHU, KIM KWOK	

ART UNIT	PAPER NUMBER
2653	8

DATE MAILED: 07/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/783,008	GIBSON, GARY A.	
	Examiner	Art Unit	
	Kim-Kwok CHU	2653	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Amendment filed on 4/7/04 (paper 7)*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-17,19,21 and 22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-17,19,21 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Remarks

1. Applicant's Remarks (paper 7) filed on April 7, 2004 have been fully considered.

(a) referring to claim 9, Applicant states that Manalis's tip is for "application of voltage" (page 5 of the Remarks, lines 20 and 21). Applicant submits that "a tip for applying a voltage is therefore different from an energy-emitting tip" (page 5 of the Remarks, lines 24 and 25). Accordingly, Manalis teaches an AFM tip which can oxidize a metal substrate (column 1, lines 58-60). By applying a voltage, electrons (energy) are emitted from the tip to oxidize the metal surface. Therefore, Manalis teaches an energy-emitting tip. In other words, to emit energy such as light, thermal or electron etc., a voltage is required as a source of energy generating means;

(b) referring to claim 12, Applicant does not agree that the prior art of Manalis teaches "molecule". Accordingly, Manalis teaches a fluid layer which is made up of fluid molecules.

(c) referring to claim 1, Applicant states that the prior art of Hillner teaches near-field microscopy, not a data storage device (page 8 of the Remarks, last line). A newly found art of Greiner is cited as a secondary reference;

(d) Applicant states that the prior art of Manalis fails to teach an energy-emitting tip (page 9 Remarks, lines 9 and 10).

Accordingly, Manalis teaches an AFM tip which can oxidize a metal substrate (column 1, lines 58-60). By applying a voltage, electrons (energy) are emitted from the tip to oxidize the metal surface; and

(e) Applicant states that the prior art of Manalis fails to teach "particles contained in the fluid medium" (page 9 of the remarks, lines 10 and 11). Accordingly, in Fig. 2, Manalis teaches that the tip 115 is in a contact mode with the substrate S and a thin layer of fluid absorbed on there as it is scanned over the surface (column 2, lines 40-43, lines 54-56). Although Manalis does not disclose that the fluid consists particle, the word "particle" according to the Merriam-Webster Online Dictionary (www.m-w.com) has the following definition:

1 a: a minute quantity or fragment b: a relatively small or the smallest discrete portion or amount of something

2 *archaic* : a clause or article of a composition or document

3 : any of the basic units of matter and energy (as a molecule, atom, proton, electron, or photon).

In other words, Manalis's fluid contains particles which are the basic units of the fluid.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> *A person shall be entitled to a patent unless --*
> *(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.*

3. Claims 9, 10, 12 and 14 are rejected under 35 U.S.C. § 102(e) as being anticipated by Manalis et al. (U.S. Patent 6,519,221).

Manalis teaches an optical disk having all of the elements and means as recited in claims 9, 10 and 14. For example, Manalis teaches the following:

(a) as in claim 9, a data-storage device (Fig. 1);

(b) as in claim 9, a storage medium S (Fig. 1);

(c) as in claim 9, nanometer-scaled data storage areas in the storage medium (Fig. 1; column 1, lines 66 and 67; column 3, lines 38 and 39);

(d) as in claim 9, an energy-emitting tip 115 positioned in close proximity to the storage medium (Fig. 1);

(e) as in claim 9, molecules positioned between the energy-emitting tip 115 and the storage medium S wherein the molecules are at least partially immersed in a fluid medium (Fig. 1; column 2, lines 42 and 43; the fluid layer is particles/molecules in a liquid form);

(f) as in claim 10, the energy-emitting tip emits electrons (Fig. 1; AFM where its tip emits electrons to oxidize the medium's surface);

(g) as in claim 12, each of the molecules comprises a one-dimensional molecules (the molecules are arranged in a line); and

(h) as in claim 14, the molecules comprise conductive molecules (the fluid layer is conductive so that indents can be formed and read electrically).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> *(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

5. Claims 1, 2, 7, 8, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007).

Manalis teaches a data storage device very similar to that of the instant invention. For example, Manalis teaches the following:

(a) as in claim 1, a data-storage device (Fig. 1);

(b) as in claim 1, a storage medium S (Fig. 1);

(c) as in claim 1, nanometer-scaled data storage areas in the storage medium (Fig. 1; column 1, lines 66 and 67; column 3, lines 38 and 39);

(d) as in claim 1, an energy-emitting tip 115 positioned in close proximity to the storage medium (Fig. 1);

(e) as in claim 1, a fluid medium positioned between the energy-emitting tip 115 and the storage medium S (Fig. 1; column 2, lines 42 and 43);

(f) as in claim 1, particles contained in the fluid medium (Fig. 1; fluid consist fluid particles in a liquid form);

(g) as in claim 2, the energy-emitting tip emits electrons (Fig. 1; AFM where its tip emits electrons to oxidize the medium's surface); and

(h) as in claim 8, the particles form a bridge between the tip and the storage medium (Fig. 1; fluid is an interface between the tip and the medium).

However, Manalis does not teach the following:

(a) as in claim 1, the fluid medium comprises a ferrofluid; and

(b) as in claim 7, the particles comprise a magnetic material.

Greiner teaches a nanometer-scale/near-field data storage process having the following:

(a) a ferrofluid suspension layer (Fig. 1; column 10, lines 22-26); and

(b) the ferrofluid having a magnetic material (Fig. 1; column 10, lines 22-26).

A data storage system using a scanning probe in a nanometer scale requires its data be correctly read without moving the probe too close or too far away from the medium. For example, Greiner uses a ferrofluid magnetic layer to enhance the data detection due to the scanning distance between the head and the information carrier. Similarly, although Manalis does not specify what is the fluid layer between the tip 115 and the substrate S, it would have been obvious to one of ordinary skill in the art to use a ferrofluid layer such as Greiner 's as Manalis's thin fluid layer, because the ferrofluid layer is a magnetic layer which improves the scanning sensitivity of Manalis's tip movement in a z-axis by immersing the scanned surface with a magnetic path.

6. Claim 21 has limitations similar to those treated in the above rejection, and is met by the references as discussed above.

7. Method claim 22 is drawn to the method of using the corresponding apparatus claimed in claim 1. Therefore method claim 22 corresponds to apparatus claim 1 and is rejected for the same reason of obviousness as used above.

8. Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007) and Durig et al. (U.S. Patent 6,084,849).

Manalis in view of Greiner teach a data storage device very similar to that of the instant invention. However, both Manalis and Greiner do not teach the following:

(a) as in claim 3, the energy-emitting tip emits thermal energy.

Durig teaches a storage medium where an emitting tip emits heat energy (Figs 3A-3C; column 2, lines 25-42).

To cause a bump as a data bit on a storage medium by using an AFM, either an electrons emitting probe such as Manalis's or a heat emitting probe such as Durig's can be used. Hence, for providing energy to the tip of the AFM, it would have been obvious to one of ordinary skill in the art at the time of invention to choose either electron energy or heat energy, because both electron and heat are commonly used to make an indent on the surface of the storage medium.

9. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007) and Cleveland et al. (U.S. Patent 5,925,818).

Manalis in view of Greiner teach a data storage device very similar to that of the instant invention. However, both Manalis and Greiner do not teach the following:

(a) as in claims 5 and 6, the fluid comprised a high dielectric fluid/material.

Cleveland teaches an AFM where:

(a) a layer of dielectric fluid is used (column 14, lines 3-14; dielectric material contain conductive molecules because it is not an absolute insulating material).

To improve the AFM's performance such as decrease the detection error, a non-conducing spacer may be located between Manalis's energy emitting tip and the storage medium. Hence, it would have been obvious to one of ordinary skill in the art to use a high dielectric fluid such as Cleveland's, because the high dielectric fluid can prevent ionized air which causes phenomena such as the variation of the relative capacitance between the tip and the storage medium.

10. Claim 11 rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Durig et al. (U.S. Patent 6,084,849).

Manalis teaches a data storage device very similar to that of the instant invention. However, Manalis does not teach the following:

(a) as in claim 11, the energy-emitting tip emits thermal energy.

Durig teaches a storage medium where an emitting tip emits heat energy (Figs 3A-3C; column 2, lines 25-42).

To cause a bump as a data bit on a storage medium by using an AFM, either an electrons emitting probe such as Manalis's or a heat emitting probe such as Durig's can be used. Hence, for providing energy to the tip of the AFM, it would have been obvious to one of ordinary skill in the art at the time of invention to choose either electron energy or heat energy, because both electron and heat are commonly used to make an indent on the surface of the storage medium.

11. Claims 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Schaffer et al. (U.S. Patent 6,391,217).

Manalis teaches a data storage device very similar to that of the instant invention. However, Manalis does not teach the following:

(a) as in claim 13, the conductor molecules comprise polymers.

Schaffer teaches an AFM having a liquified conductive layer 110 made of dielectric polymer (Fig. 4b; column 4, lines 37-48).

For a conductive material act as a fluid, it would have been obvious to one of ordinary skill in the art to use Schaffer's dielectric polymer as Manalis's fluid, because the dielectric polymer is a liquefied conductive material.

12. Claims 15, 16, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007).

Manalis teaches a data storage method very similar to that of the instant invention. For example, Manalis teaches the following steps:

(a) as in claim 15, providing a storage medium S comprising nanometer-scale data storage area (Fig. 1; column 1, lines 66 and 67; column 3, lines 38 and 39);

(b) as in claim 15, positioning an energy-emitting tip 115 in close proximity to the storage medium (Fig. 1);

(c) as in claim 15, guiding energy emitted from the energy-emitting tip to the storage area (Fig. 1);

(d) as in claim 15, the guiding step comprises channeling the energy-emitted through particle in a fluid medium between the storage medium and the energy-emitting tip (Fig. 1; column 4, lines 59-62);

(e) as in claim 15, altering a state of the storage areas with the emitted, guided step (Fig. 1; the altering state is the oxidation process);

(f) as in claim 16, the guiding step comprises channeling the energy emitted through molecules positioned between the storage medium and the energy-emitting tip (Fig. 1; column 4, lines 59-62; oxidation process is through the fluid layer);

(g) as in claim 17, the molecules in the fluid medium comprises one-dimensional molecules (the fluid layer having molecules formed in one-dimension); and

(h) as in claim 19, the guiding step comprises using particles that form a bridge between the storage medium and the energy-emitting tip (Fig. 1; fluid is an interface between the tip and the medium).

However, Manalis does not teach the following steps;

(a) as in claim 15, the fluid medium is a ferrofluid; and

(b) as in claim 17, the fluid medium is conductive.

Greiner teaches a nanometer-scale/near-field data storage having the following feature:

(a) the fluid medium is a ferrofluid (Fig. 1; column 10, lines 22-26); and

(b) as in claim 17, the fluid medium is conductive (Fig. 1; ferrofluid is conductive).

A data storage system using a scanning probe in a nanometer scale requires its data be correctly read without moving the probe too close or too far away from the medium. For example, Greiner uses a ferrofluid magnetic layer to enhance the data detection due to the scanning distance between the head and the information carrier. Similarly, although Manalis does not specify what is the fluid layer between the tip 115 and the substrate S, it would have been obvious to one of ordinary skill

in the art to use a ferrofluid layer such as Greiner 's as Manalis's thin fluid layer, because the ferrofluid layer is a magnetic layer which improves the scanning sensitivity of Manalis's tip movement in a z-axis by immersing the scanned surface with a conductive path.

Prior Art

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Winningham et al. (6,579,463) is pertinent because Winningham teaches an AFM probe.

Hansma et al. (5,581,082) is pertinent because Hansma teaches an AFM which holds fluid to reduce forces applied to the sample by the cantilever.

14. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks Washington, D.C. 20231 Or faxed to:

(703) 872-9306 (for formal communications intended for entry. Or:

(703) 746-6909, (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-4700.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kim CHU whose telephone number is (703) 305-3032 between 9:30 am to 6:00 pm, Monday to Friday.

KC 6/24/04

Kim-Kwok CHU
Examiner AU2653
June 24, 2004

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